

CLAIMS

What is claimed is:

1. A communications unit comprising:

a first communications means that controls communications between said communications unit and one or a plurality of other communications units connected to said communications unit; and

a second communications means that controls communications between said communications unit and a client communications apparatus, wherein

said communication unit is installed in a mapped unitary flooring of a construction or in a mapped unitary flooring, and said communication units and said one or a plurality of other communication units installed in said mapped unitary flooring are interconnected to form a communication network that serves said client communications apparatus.

2. A communications unit comprising:

a first communications means that controls communications between said communications unit and one or a plurality of other communications units connected to said communications unit; and

a second communications means that controls communications between said communications unit and a client communications apparatus, wherein

said communication unit is installed in a unitary partition panel of a construction, and said communication units and said one or a plurality of other communication units installed in said unitary partition panel are interconnected to form a communication network that serves said client communications apparatus.

3. A communications unit according to Claim 1, further comprising:

storage means that stores location information indicating a location where said communication unit is located,

wherein said second communication means transmits location information stored in said storage means to said client communications apparatus.

4. A communication unit according to Claim 1, further comprising
a plurality of connection parts for connecting to said one or a plurality of other communications units, said plurality of connection parts being provided on a surface of said communication unit, said surface touching at least one of said one or a plurality of other communications units, wherein:
 - each of said communications unit and said one or a plurality of other communications units have an identifier;
 - said communication unit further comprises an operation unit;
 - when said operation unit is operated, said first communications unit determines whether at least one of said one or a plurality of other communications units is connected to at least one of said plurality of connection parts; and
 - when at least one of said plurality of said one or a plurality of said other communications units are determined to be connected to at least one of said plurality of connection parts, said communications unit communicates with said at least one of said plurality of other communications units, and acquires said identifier of said at least one of said plurality of other communications units.
5. A communication unit according to Claim 1, further comprising
a plurality of connection parts for connecting to said one or a plurality of said other communications units, said plurality of connection parts being provided on a surface of said communication unit, said surface touching at least one of said plurality of other communications units, wherein:
 - each of said communications units and said one or a plurality of other communications units has an identifier;
 - when said first communication means receives an instruction to update a connection state, said first communications unit determines whether at least one of said plurality of other communications units is connected to at least one of said plurality of connection parts; and
 - when at least one of said plurality of other communications units are determined to be connected to at least one of said plurality of connection parts, said at least one communications unit communicates with said at least one of said plurality of other

communications units, and acquires said identifier of said at least one of said plurality of other communications units.

6. A communication unit according to Claim 1, wherein:

said client communications apparatus comprises

a transmitter main electrode provided in a location so as to readily exert an electric effect on a dielectric; and

a modulator that modulates an electric potential to said transmitter main electrode in response to an electric signal corresponding to transmitted data;

said client communications apparatus provides to said dielectric an electric field corresponding to the modulated electric potential;

said communications unit further comprises a receiver main electrode provided in a location so as to readily exert an electric effect on a dielectric; and

said second communications means comprises

a measuring part that measures an electric state of said receiver main electrode exerted by said electric field; and

a demodulator that acquires said electric signal from said measuring part and acquires said transmitted data by demodulating said electric signal.

7. A communication unit according to Claim 6, wherein said measuring part comprises:

an electro-optical crystal that exhibits a Pockels Effect and modulates light penetrating said electro-optical crystal in response to an electric field in the space where said electro-optical crystal is located;

light emitting means that emits light to said electro-optical crystal; and

light receiving means that receives light penetrating said electro-optical crystal, and output signals in response to the received light.

8. A communications unit according to Claim 1, wherein:

said client communications apparatus comprises:

a transmitter main electrode provided in a location that readily exerts an electric effect on a dielectric;

a transmitter return electrode; and

a modulator that changes the voltage difference between said transmitter main electrode and said transmitter return electrode in response to an electric signal corresponding to the transmitted data, said client communications apparatus provides to said dielectric an electric field corresponding to changes in the voltage generated by said modulator;

said communications unit further comprises:

a receiver main electrode provided in a location that readily exerts an electric effect on a dielectric, the location being in the surface of said communications unit; and

a receiver return electrode connected to said communications unit to establish a return path with said transmitter feed back electrode; and
said second communications means comprises:

a measuring part that measures the electric state generated between said receiver main electrode and said receiver return electrode by the electric field provided to said dielectric; and

a demodulator that acquires said electric signal based on the measurement result from said measuring part, and acquires data transmitted from said client communications apparatus by demodulating said electric signal.

9. A communications unit according to claim 1, wherein:

said communications unit further comprises a transmitter return electrode provided in a location that readily exerts an electric effect on a dielectric, the location being in the surface of said communications unit;

said second communications means comprises:

signal generator that generates an electric signal corresponding to data to be transmitted; and

a modulator that changes an electric potential provided to said transmitter main electrode in response to said electric signal,

said second communications means provide to said dielectric an electric field corresponding to changes in the electric potential generated by said modulator; and

said client communications apparatus comprises

a receiver main electrode provided in a location where said receiver main electrode is readily subject to an electric effect by said dielectric;

a measuring part that measures the electric state generated at said receiver main electrode by the electric field provided to said dielectric; and

a demodulator that acquires said electric signal based on the measurement result from said measuring part, and acquires data transmitted from said to said communications unit by demodulating said electric signal.

10. A communications unit according to Claim 1, further comprising

a transmitter return electrode provided in a location that readily exerts an electric effect on a dielectric, the location being in the surface of said communications unit, and a receiver return electrode connected to said communications unit, wherein said second communications means comprises

signal generator that generates an electric signal corresponding to data to be transmitted, and

a modulator that changes an electric potential provided to said transmitter main electrode in response to said electric signal,

said second communications means provide to said dielectric an electric field corresponding to changes in the electric potential generated by said modulator, and said client communications apparatus comprises:

a receiver main electrode provided in a location where said receiver electrode is readily subject to an electric effect by said dielectric;

a receiver return electrode for establishing a return path with said transmitter return electrode;

measuring part that measures the electric state generated between said receiver main electrode and said receiver return electrode by the electric field provided to said dielectric; and

a demodulator that acquires said electric signal based on the measurement result from said measuring part, and acquires data transmitted from said to said communications unit by demodulating said electric signal.

11. A communications unit according to claim 6, wherein:
 - said receiver main electrodes are severally provided on the surface of said communications unit;
 - said measuring part measures the strength of said electric field at each of said receiver main electrodes; and
 - said communications unit further comprises:
 - storage means that store location information indicating the location where said communications unit is disposed; and
 - location detection means that acquires locations of said client communications apparatus, based on the measurement result by said measuring part and information stored in said storage means.
12. A communications unit according to claim 11, wherein
 - said client communications apparatus comprises two transmitter main electrodes on its lower surface;
 - said client communications apparatus can generate an electric field from one of said two transmitter main electrodes;
 - each of said receiver main electrodes are provided on the surface of said communications unit;
 - said measuring part measures at each said receiver main electrode the electric field generated from said transmitter main electrode;
 - said location detection means acquires the location of each of said transmitter main electrodes, based on the measurement result by said measurement part and information stored in said storage means.
13. A communications unit according to claim 1, further comprising:
 - a pair of first electrodes that are located in an interval, and a directional coupling element that connects said pair of first electrodes, the pair of first electrodes being provided on footwear on one foot or the other worn by a person who is on said communications unit;

a plurality of second electrodes provided on the surface of said communications unit;

storage means that store location information that indicates the locations of said plurality of second electrodes on the surface of said communications unit;

measuring means that consecutively select a pair of second electrodes from among said plurality of second electrodes, measures an electric potential induced at one of the selected pair of with the other of said pair of second electrodes being applied the change in electric potential; and

direction detection means that acquires the direction of said person based on information recorded in said storage means and the measurement result by said measurement means.

14. A communications unit according to claim 1, further comprising:

a pair of first electrodes that are located in an interval, and a directional coupling element that connects said pair of first electrodes, the pair of first electrodes being provided on object located on said communications unit;

a plurality of second electrodes provided on the surface of said communications unit;

storage means that store location information that indicates the locations of said plurality of second electrodes on the surface of said communications unit;

measuring means that consecutively select a pair of second electrodes from among said plurality of second electrodes, measures an electric potential induced at one of the selected pair of with the other of said pair of second electrodes being applied the change in electric potential; and

direction detection means that acquires the direction of said object based on information recorded in said storage means and the measurement result by said measurement means.

15. A communications unit according to Claim 1, further comprising:

a pair of first electrodes that are located in an interval, and a directional coupling element that connects said pair of first electrodes, the pair of first electrodes being

provided on footwear on one foot or the other worn by a person who is on said communications unit;

a plurality of second electrodes provided on the surface of said communications unit;

storage means that store location information that indicates the location of said communications unit and location information that indicates the locations of said plurality of second electrodes on the surface of said communications unit;

measuring means that consecutively select a pair of second electrodes from among said plurality of second electrodes, measures an electric potential induced at one of the selected pair of with the other of said pair of second electrodes being applied the change in electric potential; and

direction detection means that acquires the direction of said person based on information recorded in said storage means and the measurement result by said measurement means.

16. A communications unit according to claim 1, further comprising:

a pair of first electrodes that are located in an interval, and a directional coupling element that connects said pair of first electrodes, the pair of first electrodes being provided on object located on said communications unit;

a plurality of second electrodes provided on the surface of said communications unit;

storage means that store location information that indicates the location of said communications unit and location information that indicates the locations of said plurality of second electrodes on the surface of said communications unit;

measuring means that consecutively select a pair of second electrodes from among said plurality of second electrodes, measures an electric potential induced at one of the selected pair of with the other of said pair of second electrodes being applied the change in electric potential; and

direction detection means that acquires the direction of said object based on information recorded in said storage means and the measurement result by said measurement means.

17. A communications unit according to Claim 1, wherein said client communications apparatus comprises:
 - a first electrode and a second electrode formed on a surface in contact with a face of said communications unit;
 - a rectifier circuit that converts to DC voltage the AC voltage induced between said first electrode and said second electrode; and
 - a battery that is charged by the DC voltage acquired by said rectifier circuit,and said communications unit further comprises:
 - a third electrode formed on a surface of said communications unit, the surface contacting said client communications apparatus;
 - a fourth electrode connected to said communications unit for establishing a return path; and
 - an oscillator that applies, between said third electrode and said fourth electrode, an AC voltage for performing charging of said communications apparatus.
18. A communications unit according to Claim 1, wherein said client communications apparatus comprises:
 - a secondary coil provided on a surface in contact with a face of said communications unit;
 - a rectifier circuit that converts to DC voltage the AC voltage induced at said secondary coil; and
 - a battery that is charged by the DC voltage acquired by said rectifier circuit,and said communications unit further comprises:
 - a primary coil provided on a surface in contact with said client communications apparatus; and
 - an oscillator that applies to said primary coil an AC voltage for charging said client communications apparatus.

19. A management apparatus for managing communications network formed by a plurality of communications unit of Claim 1, said management apparatus comprising:
detection means that detect the network topology of said communications network;
and
notification means that notify the user of said management apparatus of information indicating the connection status of said plurality of communications units, based on the network topology detected by said detection means.
20. A management apparatus according to claim 19, wherein
said detection means detects the network topology of said communications network, in the case where new communications unit is added to said communications network and at least one of said plurality of communications units is removed.
21. A management apparatus according to claim 19, wherein
each of said plurality of communications unit is located so as to adjoin at least one of other communications unit,
said management apparatus further comprises acquisition means that acquire information indicating the size, the form, and connection locations of said plurality of communications units,
said notification means notify the user of said management apparatus of information indicating the location states of said plurality of communications unit, based on the network topology detected by said detection means and information acquired by said acquisition means.
22. A management apparatus for managing communications network formed by a plurality of communications unit of Claim 1, said management apparatus comprising:
storage means that store reference point information showing a location of reference point for computing the location of said plurality of communications units;
detection means that detect the network topology of said communications network;
acquisition means that acquire information indicating the size, the form, and connection locations of said plurality of communications units;

location detection means that acquire the locations of at least one of said plurality of communications units, based on reference point information stored in said storage means, the network topology detected by said detection means, and information acquired by said acquisition means; and

transmission means that transmit to said communications unit location information acquired by said location detection means.